RETAINING SYSTEM FOR SECURING A CUTTING TOOL TO A SUPPORT BLOCK

FIELD OF THE INVENTION

The present invention relates, in general, to cutting tools and, more particularly, this invention relates to an improved retaining system for retaining such cutting tools in their support blocks.

BACKGROUND OF THE INVENTION

Prior to the conception and development of the present invention, cutting tool assemblies have been in widespread use. These cutting tool assemblies are used, typically, in mining and in the surface milling of roads. The cutting tool usually carries a hardened tip for increased tool life and is rotatably mounted into a support block. The support blocks are either bolted or welded onto a drum or other carrier, which in turn is driven to engage the cutting tools forcibly into whatever material is chosen to be addressed by the machinery.

Typically, the aforementioned drum is limited in rotation speed due to unreliable clips or fittings holding the cutting tool into the support block. To increase performance of milling in mines and on roads, it is desirable to have much faster drum rotation. A problem in increasing rotation speeds utilizing retaining clips prior to the present invention is that cutting tools come loose from their support blocks and become

projectiles, thereby endangering people and structures in the vicinity of the operation. The standard fastener is a singular, rear-mounted clip held in a groove by friction or spring action.

SUMMARY OF THE INVENTION

The present invention provides a retaining system for securing a cutting tool to a support block. The retaining system includes at least one groove, having a first predetermined shape, formed in an outer surface of a shank portion of such cutting tool. The at least one groove is formed in a direction transverse to a longitudinal axis of the shank portion. There is at least one groove, having a second predetermined shape, formed in a surface of a bore formed through an axis of the support block for receiving therein such shank portion of the cutting tool. The at least one groove formed in the outer surface of such shank portion of the cutting tool is radially opposed to the at least one groove formed in the surface of such bore formed through the axis of the support block when such shank portion is inserted into the bore of the support block. The final essential element of the retaining system is at least one pin member engageable with each of such at least one groove formed in the outer surface of such shank portion of the cutting tool and the at least one groove formed in such surface of the bore formed through the axis of

the support block for securing the cutting tool to the support block.

OBJECTS OF THE INVENTION

It is, therefore, one of the primary objects of the present invention to provide an improved retaining system for affixing a cutting tool to a support block more securely.

Another object of the present invention is to provide an improved retaining system for securing a cutting tool to a support block to provide an improved operating life.

Yet another object of the present invention is to provide an improved retaining system for securing a cutting tool to a support block that allows easy removal of the cutting tool from the support block.

Still another object of the present invention is to provide an improved retaining system for securing a cutting tool to a support block that requires simple tools to remove the cutting tool from the support block.

Yet another object of the present invention is to provide an improved retaining system for securing a cutting tool to a support block that is easy to manufacture.

A further object of the present invention is to provide an improved retaining system for securing a cutting tool to a support block that is easily adaptable to prior art type cutting tools.

A still further object of the present invention is to provide an improved retaining system for securing a cutting tool to a support block that supports higher tip speeds of the cutting tool thereby promoting increased productivity.

A yet further object of the present invention is to provide an improved retaining system for securing a cutting tool to a support block that increases productivity resulting in lower production costs.

In addition to the objectives and advantages listed above, various other objectives and advantages of the present invention will become more readily apparent to persons skilled in the relevant art from a reading of the detailed description section of this document. The other objectives and advantages will become particularly apparent when the detailed description is considered along with the attached drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is side view of a cutting tool mounted in a support block in accordance with a presently preferred embodiment of the invention.

Figure 2 is a side view of a cutting tool according to a presently preferred embodiment of the invention.

Figure 3 is a side view of a support block in accordance with a presently preferred embodiment of the invention.

Figure 4 is an front view of a support block of a presently preferred embodiment of the invention.

Figure 5 is a side view of a rolled steel pin as used in a presently preferred embodiment of the invention.

Figure 6 is an end view of a rolled steel pin as illustrated in Figure 5.

Figure 7 is a side view of a cutting tool according to prior art.

BRIEF DESCRIPTION OF A PRESENTLY PREFERRED AND VARIOUS ALTERNATIVE EMBODIMENTS OF THE INVENTION

Prior to proceeding to a much more detailed description of the present invention, it should be noted that identical components which have identical functions have been identified with identical reference numerals throughout the several views illustrated in the drawing figures for the sake of clarity and understanding of the invention.

Referring initially to Figures 1 and 2, a retaining system is generally indicated by reference numeral 10, the retaining system 10 includes a cutting tool 14 and a support block 12. There is at least one groove 2 having a predetermined shape, formed in an outer surface of a shank portion 4 of the cutting tool 14, groove 2 being formed in a direction transverse to a longitudinal axis of shank 4. Preferably such predetermined shape is oblong.

In Figure 1 and Figure 7 the shank portion 4 further includes a circumferential groove 6 formed closely adjacent an end of shank portion 4 for receiving a washer like member 7 to further retain the cutting tool in such support block 12.

Figure 1 depicts at least one groove 16a and 16b, having a round shape, formed in a surface of a bore 18 which is formed through an axis of the support block 12. Bore 18 is for receiving therein such shank portion 4 of the cutting tool 14. The groove 2 formed in the outer surface of the shank portion 4 of cutting tool 14 is radially opposed to the grooves 16a and 16b formed in the surface of bore 18 of support block 12 when shank portion 4 is inserted into bore 18 of support block 12. Grooves 16a and 16b correspond respectively with apertures 20a and 20b of support block 12 in Figure 3.

When shank portion 4 is inserted into bore 18 of support block 12 at least one pin member 8, preferably two pins 8, are inserted into apertures 20a and 20b and are engageable with groove 2 of shank portion 4 of cutting tool 14 and grooves 16a and 16b formed in surface of bore 18 for securing the cutting tool 14 within support block 12. Once pins 8 are fully inserted into apertures 20a and 20b, through grooves 16 a and 16b respectively, and while shank portion 4 is fully inserted into support block 12, the presence of pins 8 prevents shank portion 4 from being removed from bore 18 of support block 12.

Pins 8 are formed of at least one of metal, plastic, ceramic or various combinations thereof. More particularly metal and preferably rolled spring steel pins are used. Such pins 8 are slightly compressed when inserted through apertures 20a and 20b and tend to grip the sides of apertures 20 and 20b thereby keeping pins 8 within such apertures 20 and 20b. Groove 2 of shank portion 4 is formed slightly larger than pins 8 so that the expanded size of pins 8, although limited in expansion by the slightly smaller size of apertures 20a and 20b, and thereby smaller than the diameter or groove 2, shaft portion 4 is allowed to laterally rotate within bore 18 of support block 12. Such rotation allows for more even wear of the carbide tip of the cutting tool assembly 10.

In an alternative embodiment of the present invention, groove 2 of shaft 4 may be formed less than a complete circumference of shaft 4 or just a partial circumference to allow rotation in both directions but not a complete lateral rotation in one direction or the other.

While the present invention has been described by way of a detailed description of a particularly preferred embodiment or embodiments, it will be apparent to those of ordinary skill in the art that various substitutions of equivalents may be affected without departing from the spirit or scope of the invention as set forth in the appended claims.